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10/029,883	12/31/2001	Moses Samson Charikar	0026-0014	4029
44989	7590	05/08/2006	EXAMINER	
HARRITY SNYDER, LLP 11350 Random Hills Road SUITE 600 FAIRFAX, VA 22030			DODDS, HAROLD E	
			ART UNIT	PAPER NUMBER
			2168	

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/029,883

Applicant(s)

CHARIKAR, MOSES SAMSON

Examiner

Harold E. Dodds, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-21, 28 and 29 is/are allowed.
- 6) ☒ Claim(s) 22-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 101***

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claim 27 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 27 fails to provide a practical application that produces a useful, concrete, and tangible result. Claim 27 lacks a useful result because consideration of the range of described practical utilities indicates a requirement that a compact representation of the object be generated and the claim fails to fulfill that described requirement. Additionally, claim 27 lacks a tangible result. The claimed limitations perform an abstraction, particularly a mathematical abstraction. It is irrelevant whether a claim recites a method or a machine that acts to carry out a mathematical abstraction, *in toto*. See *Gottschalk v. Benson*, 409 U.S. 63, 71-72 (1972). This claim appears to preempt a mathematical abstract idea. It does not produce a real-world values result that is necessary to have met the "tangible result" requirement. Additionally, claim 27 is merely directed to a computer program, *per se*, which is non-statutory functional descriptive material. Each of the "means" may be interpreted to be described software portions "for" performance of the corresponding claimed functions, thus providing a claimed "system" that is a "software system". Since the "software system" is not recited as being stored on an appropriate computer readable storage medium the functionality of the software system cannot be realized on execution and thus, fails in this respect to provide a practical application.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 22, 23, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broder et al. (U.S. Patent No. 6,349,396) and Hatakeyama et al. (U.S. Patent No. 5,469,354).

5. Broder renders obvious independent claim 22 by the following:  
“...creating a similarity sketch for each of first and second objects...” at col. 9, lines 38-39, col. 2, lines 45-47 and col. 4, lines 52-56.  
“...to a vector representation of the first and second objects...” at col. 2, lines 53-55.  
“...the similarity sketches for the first and second objects...” at col. 2, lines 45-47 and col. 4, lines 52-56.  
“...and generating a value defining the similarity between the first and second objects...” at col. 7, lines 35-37 and col. 4, lines 52-56.

Broder does not teach the use of hashing functions or bitwise comparisons.

6. However, Hatakeyama teaches the use of hashing functions or bitwise comparisons as follows:

“...based on an application of a hashing function...” at col. 21, lines 39-42.  
“...comparing, on a bit-by-bit basis...” at col. 15, lines 58-65.  
“...based on a correspondence in the bit-by-bit comparison...” at col. 15, lines 58-65.

It would have been obvious to one of ordinary skill at the time of the invention to combine Hatakeyama with Broder to use hashing functions in order to reduce the size of the representation of objects for classification in hash buckets. Likewise, it would have been obvious to one of ordinary skill at the time of the invention to combine Hatakeyama with Broder to use bitwise comparison in order to determine the similarity between the representations of objects. Broder and Hatakeyama teach the use of related applications. They teach the use of computers, the use of documents, the use of words, the use of representations, the use of hashing, the use of values, and the measurement of similarity. Broder provides sketches, vectors, and objects and Hatakeyama provides hashing functions and bitwise comparisons.

7. As per claim 23, the "...determining that the first and second objects are similar...", is taught by Broder at col. 4, lines 52-56, the "...when the value defining the similarity...", is taught by Broder at col. 7, lines 35-37 and col. 4, lines 52-56, and the "...is greater than a predetermined threshold...", is taught by Broder at col. 8, lines 23-27.

8. As per independent claim 26, the "...at least one processor...", is taught by Broder in Figure 1, the "...a database comprising a plurality of documents...", is taught by Hatakeyama at col.45, lines 54-62, the "...and a memory operatively coupled to the processor...", is taught by Broder in Figure 1,

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the "...memory storing program instructions that when executed by the processor...", is taught by Broder in Figure 1,

the "...cause the processor to remove similar objects...", is taught by Broder at col. 10, lines 33-35 and col. 4, lines 52-56,

the "...from the database...", is taught by Hatakeyama at col.45, lines 54-62,

the "...by comparing similarity sketches of pairs of objects...", is taught by Broder at col. 2, lines 45-47 and col. 4, lines 52-56,

the "...in the database...", is taught by Hatakeyama at col.45, lines 54-62,

the "...and removing one of the objects of the pair...", is taught by Broder at col. 10, lines 33-35 and col. 4, lines 52-56,

the "...when the comparison indicates that the pair of objects...", is taught by Broder at col. 10, lines 48-49 and col. 4, lines 52-56,

the "...are more similar than a threshold level of similarity...", is taught by Broder at col. 8, lines 23-27

the "...processor generating the similarity sketches for each of the pair of objects...", is taught by Broder at col. 2, lines 46-47 and col. 4, lines 52-56,

the "...based on application of a hashing function...", is taught by Hatakeyama at col. 21, lines 39-42,

and the "...to vector representations of the objects...", is taught by Broder at col. 2, lines 53-55, col. 3, lines 1-4, and col. 4, lines 52-56.

9. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broder and Hatakeyama as applied to claim 22 above, and further in

view of Caid et al. (U.S. Patent No. 5,794,178) and Kisor et al. (U.S. Patent No. 5,067,152).

As per claim 24, the "...generating a vector corresponding to the first and second objects...", is taught by Broder at col. 2, lines 45-47 and col. 4, lines 52-56, but the "...each coordinate of the vector being associated with a corresponding weight...", the "...multiplying the weight associated with each coordinate in the vector...", the "...by a corresponding hashing vector to generate a product vector...", the "...summing the product vectors...", the "...and calculating a bit corresponding to each coordinate...", and the "...of the summed product vector...", are not taught by either Broder or Hatakeyama.

However, Caid teaches the use of coordinates of vectors with weights as follows:

"...By virtue of this formula, we can see that each  $w_i$  vector is expressed as a weighted sum of a fixed set of  $N$  vectors (the  $u_j$ )..." at col. 20, lines 17-20.

"...If we reexpress our  $w_i$  vectors in terms of the  $u_j$  basis vectors (i.e., taking the first coordinate of this new representation to be the  $u_1$  component, the second to be the  $u_2$  component, and so on) we get..." at col. 20, lines 40-44.

It would have been obvious to one of ordinary skill at the time of the invention to combine Caid with Broder and Hatakeyama to use coordinates of vectors with weights in order to represent multi-dimensional space with a commonly used representation to gain acceptance of the system. Broder, Hatakeyama, and Caid teach the use of related applications. They teach the use of computers, the use of documents, the use of words,

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the use of representations, the use of hashing, the use of values, and the measurement of similarity and Broder and Caid teach the use of networks, the use of vectors, and the use of objects. Broder provides sketches, vectors, and objects, Hatakeyama provides hashing functions and bitwise comparisons, and Caid provides coordinates of vectors with weights.

Caid does not teach the use of hashing vectors, the use of product vectors, and the summing of product vectors.

However, Kisor teaches the use of hashing vectors, the use of product vectors, and the summing of product vectors as follows:

"...Study of the histogrammic distribution of the sums for the pixel elements of the different signal vectors suggested the foregoing hashing functions..." at col. 9, lines 49-51.

It would have been obvious to one of ordinary skill at the time of the invention to combine Kisor with Broder, Hatakeyama, and Caid to sum vectors in order to use a standard mathematical method of establishing relationships between vectors to gain acceptance of the system. Broder, Hatakeyama, Caid, Kisor teach the use of related applications. They teach the use of computers, the use of representations, the use of hashing, and the use of values, and Broder, Caid, and Kisor teach the use of networks and the use of vectors. Broder provides sketches, vectors, and objects, Hatakeyama provides hashing functions and bitwise comparisons, Caid provides coordinates of vectors with weights, and Kisor provides summing of hashing vectors to provide product vectors.



10. As per claim 25, the "...concatenating the generated bits..." is taught by Hatakeyama at col. 37, lines 19-22.

***Allowable Subject Matter***

11. Claims 1-21, 28 and 29 are allowed. The following is an examiner's statement of reasons for allowance: Independent claim 1 is allowable since the prior art from Chaudhuri et al. (U.S. Patent No. 5,806,061), Dasgupta (U.S. Patent No. 5,612,865), Lazarus et al. (U.S. Patent No. 6,134,532), and Kaufman et al. (U.S. Patent No. 5,101,475) does not anticipate nor render obvious the recited elements in light of claim 1. Likewise, independent claims 14 and 28 are allowable since the prior art from Chaudhuri et al. (U.S. Patent No. 5,806,061), Dasgupta (U.S. Patent No. 5,612,865), and Caid et al. (U.S. Patent No. 5,794,178) does not anticipate nor render obvious the recited elements in light of claims 14 and 28. Claim 29 is allowable since the prior art from Chaudhuri et al. (U.S. Patent No. 5,806,061), Dasgupta (U.S. Patent No. 5,612,865), Caid et al. (U.S. Patent No. 5,794,178), and Hatakeyama et al. (U.S. Patent No. 5,469,354) does not anticipate nor render obvious the recited elements in light of claim 29. Independent claims 1, 14, 28, and 29 are statutory since both the preamble and limitations state the generation of compact representations or sketches, which are special forms of compact representations. The Specification states that "storage space may be reduced by storing only one version of a set of similar documents" and "a collection of documents can be grouped together based on document similarities, thereby improving efficiency when compressing the collection of documents."

***Response to Arguments***

12. Applicant's arguments filed 24 January 2006 have been fully considered but they are not persuasive. In the first argument for independent claims 22 and 26 on page 4, paragraph 2, the Applicant states:

"In rejecting claims 22 and 26, the Examiner relies on Broder and Hatakeyama. Again, Applicant asserts that the Examiner has not made a prima facie case of obviousness with regard to these claims. More specifically, as discussed at pages 27-30 of the Amendment After Final filed October 27, 2005, the Examiner is performing an improper piece-meal analysis in which the Examiner is not even analyzing a single feature or act of the claim as a whole. For example, the Examiner contends that, in regard to the first act recited in claim 22, that Broder discloses "creating a similarity sketch" and Hatakeyama discloses "based on application of a hashing function." Although Broder discloses specific techniques for calculating sketches, the sketches of Broder are not created in the manner in which the similarity sketches of claim 22 are created. Hatakeyama does not even mention a similarity sketch. Thus, one of ordinary skill in the art would not be motivated to modify Broder to use a different technique to calculate a similarity sketch, as Hatakeyama does not disclose any different technique."

The Examiner disagrees. Broder teaches the use of hash tables as follows:

"...In practice, it is likely that a particular fingerprint belongs to only a small number of representative sketches. Therefore, for each fingerprint encountered, remember to which cluster the fingerprint belongs, and store the fingerprint in a hash table..." at col. 10, lines 53-57.

A hashing function would be an alternative method of providing a fingerprint of a representative sketch. The result of processing a hashing function would be stored in a hash table. A fingerprint of a representative sketch would be equivalent to a similarity sketch.

13. In the second argument for independent claim 27 on page 4, paragraph 4 and page 5, paragraph 1, the Applicant states:

"Applicant submits that the rejection of this claim under 35 U.S.C. § 101 is clearly improper in view of the recently released "Interim Guidelines for Examination of Patent

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Applications for Patent Subject Matter Eligibility" (Office Gazette of November 22, 2005, referred to herein as "Guidelines"). Claim 27 is directed to a system for generating a compact representation of an object and includes means for summing product vectors to obtain a summed product vector. As described in the specification, a compact representation of an object can be very useful (see Spec., paragraphs 0002 through 0005). Further, the compact representation, as represented by the summed product vector, is a useful, concrete and tangible result. Moreover, claim 27 is written in means plus function format, as permitted by 35 U.S.C. § 112, sixth paragraph. Accordingly, Applicant submits that when properly construed, claim 27 covers structure described in the specification and thus the rejection of this claim under U.S.C. §§ 101 and 112, first paragraph, should be withdrawn."

The Examiner disagrees. Applicant is misapplying the "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Office Gazette of November 22, 2005, referred to herein as "Guidelines"). The limitations in independent claim 27 are inconsistent with the limitations in independent claim 28. In independent claim 27, the Applicant uses the term "generating a compact representation" in the preamble, but omits any mention of a compact representation in the body. The use of a compact representation in the body would make independent claim 27 statutory. Without the production of a compact representation independent claim 27 represents a mathematical formula that does not produce tangible results.

### ***Conclusion***

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harold E. Dodds, Jr. whose telephone number is (571)-272-4110. The examiner can normally be reached on Monday - Friday 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim T. Vo can be reached on (571)-272-3642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Harold E. Dodds, Jr.*

Harold E. Dodds, Jr.  
Patent Examiner  
May 4, 2006

*[Signature]*  
GREGORY A. JOHNSON  
PRIMARY EXAMINER